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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,533	12/30/2003	Chang-Youn Hwang	00939H-087700US	8876
20350	7590	09/22/2005	EXAMINER	
TOWNSEND AND TOWNSEND AND CREW, LLP TWO EMBARCADERO CENTER EIGHTH FLOOR SAN FRANCISCO, CA 94111-3834			RAO, SHRINIVAS H	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/749,533

Applicant(s)

HWANG ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/27/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d) from Korean Patent Application No. March 14, 2003 , which papers have been made of record in the application.

Information Disclosure Statement

The IDS filed on January 27, 2004 has been considered, the references cited on the PTO-1449 have been considered and initialed. The contract staff has been instructed to enclose a copy of the initialed PTO-1449 along with the instant Office Action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (U. S. Patent No. 6,369,446, herein after Tanaka).

With respect to claims 1 and 11 Tanaka describes a method for forming a storage node of a semiconductor device, comprising the steps of: forming a plurality of line patterns, each including a wire and a hard mask sequentially stacked on a surface of a substrate structure; (Tanaka figure 6A , wire 3 , hard mask – nitride layer 5 ,

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45-55) sequentially forming a first barrier layer and a first inter-layer insulation layer along a profile containing bit line patterns until filling spaces between the bit line patterns; (Tanaka figure 6B # 24,2 5) etching the first inter-layer insulation layer until a partial portion of the first inter-layer insulation layer remains on each space between the bit line patterns; (Tanaka figure 6C) (d) forming a second barrier layer on the first inter-layer insulation layer and the first barrier layer; (Tanaka fig. 6 C #25) and (e) etching the first and the second barrier layers and the remaining first inter-layer insulation layer to expose a surface of the substrate structure disposed between the line patterns. (Tanaka fig. 6 C).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-10, 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (U. S. Patent No. 6,369,446, herein after Tanaka)as applied to claim 1 above and further in view of Huang (U.S. Patent No. 6,800,452, Huang). .

With respect to claim 2 Tanaka describes the method as recited in claim 1, further comprising the steps of performing a wet cleaning/etching process with use of the first barrier layer as an etch barrier layer after the step of (c) .

With respect to claims 2 and 12 Tanaka describes the method as recited in claim, however Tanaka does not specifically describe the step of wet cleaning.

However Huang, a patent from the same filed of endeavor describes in col.3 lines 55-60, etc. describes a wet cleaning process to remove an excess material remaining and thereby form a sufficient opening area in the trench and form wider spacers.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include Huang's wet cleaning process step in Tanaka's process to remove an excess material remaining and thereby form a sufficient opening area in the trench and form wider spacers. (Huang col. 2 lines 10-15) .

With respect to claims 3 and 13 Tanaka describes the method as recited in claim 1, wherein the step includes the steps of (c-I) forming a storage node contact mask on the second inter-layer insulation layer; (Tanaka figure 42 (c) , col. 2 lines 55-60) and (c-2) performing a partial SAC etching process to the second inter-layer insulation layer with use of the storage node contact mask as an etch mask. (Huang col. 1 line 50-55)

With respect to claims 4 and 14 Tanaka describes the method as recited in claim 3 describes wherein the partial SAC etching process is carried out at a pressure of about 15 m torr to about 50 m torr with a supplied power range from about 1000 W to

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about 2000 W and employs an etch gas obtained by combining such gas as C₄F₈, CsF₅, C₄F₆, CHF₃, Ar, CO and N₂. (Huang col. 7 lines 1-5) .

With respect to claims 5 and 15 Tanaka describes the method as recited in claim 1, wherein the first barrier layer is formed by employing a low pressure technique and the second barrier layer is formed by employing a plasma deposition technique. (Haung col. 2 lines 55-60)

With respect to claims 6 and 16 Tanaka describes the method as recited in claim 5, wherein the second barrier layer is a nitride layer and the nitride layer is deposited with a thickness ranging from about 500 to about 2000 at a temperature in a range from about 500 OC to about by using a source gas of silane (SiH₄) and ammonia (NH₃). (Haung col. 2 line 60-65, claims 13, 23).

With respect to claims 7 and 17 Tanaka describes the method as recited in claim 1, wherein the etch-back process employed for etching the second barrier layer is carried out at a pressure of about 15 mtorr to about 50 mtorr with a supplied power in a range from about 1000 W to about 2000 W and employs an etch gas obtained by combining such gas as C₄F₈, CsF₅, C₄F₆, CHF₃, Ar, O₂, CO and N₂. (see rejection of claim 4 above and Tanaka col.11 examples 5-9, etc. Haung claims 13, 23).

With respect to claims 8 and 18 Tanaka describes the method as recited in claim wherein the substrate structure includes a plurality of plugs formed on a substrate and a second inter-layer insulation layer. (Tanaka figure 20 A etc. Haung figure 13 etc.).

With respect to claims 9 and 19 Tanaka describes the method as barrier layer is more and corners of each bit recited in claim 1, wherein the second barrier layer is more

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thickly deposited on an upper surface line pattern than at sidewalls of each bit line pattern. (Tanaka figure 16c, Haung figure 5).

With respect to claims 10 and 20 Tanaka describes the method as recited in claim 1, wherein at the step (e) of etching the first and the second barrier layers and the remaining first inter-layer insulation layer, a spacer is simultaneously formed with the first inter-layer insulation layer at the sidewalls of each bit line pattern. (Haung figure 5).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571)272-1718. The examiner can normally be reached on 8.00 to 5.00.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H. Rao

Patent Examiner

September 13, 2005.



LONG PHAM
PRIMARY EXAMINER